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Vjatcheslav Tretiakov

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11/18/2003

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EXAMINER

HO, ALLEN C

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application N .

10/019,323

Applicant(s)

TRETIKOV ET AL.

Examiner

Allen C. Ho

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,6 and 10-16 is/are rejected.
- 7) ☒ Claim(s) 3-5,7-9 and 17-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 June 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "6" has been used to designate both hand grip (Fig. 4) and detector housing (Fig. 6). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the multi-line digital x-ray detector claimed in claims 2 and 14 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the sliding clutches claimed in claim 6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

4. The claim(s) are narrative in form and replete with indefinite and functional or operational language. The improper use of "designed for", "in particular", "provided", and

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"and/or" is noted. The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claim(s) must be in one sentence form only. Note the format of the claims in the patent(s) cited.

5. Claim 6 is objected to because of the following informalities: Claim 6 recites the limitation "moving parts". There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

6. Claims 7 and 10 are objected to because of the following informalities: Claims 7 and 10 recite limitations that are already present in claim 1. Appropriate correction is required.

7. Claim 9 is objected to because of the following informalities: (a) is simply intended use; it fails to set forth a positive structural limitation. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 6 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 recites the limitations (a) or (b) and (c). It is unclear whether it should be interpreted as (a) or ((b) and (c)), or ((a) or (b)) and (c).

10. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim

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does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

Claim 11 recites the broad recitation  $4^{\circ} < \alpha < 12^{\circ}$ , and the claim also recites  $\alpha = 6^{\circ}$  which is the narrower statement of the range/limitation.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1, 2, 10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwieker *et al.* (U. S. Patent No. 6,382,832 B1) in view of Kagaya (U. S. Patent No. 5,463,668).

With regard to claim 1, Schwieker *et al.* disclosed a digital x-ray scanning apparatus comprising an x-ray source (5), an x-ray collimator (6), an x-ray detector (7), mounting

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means (1) for mounting the x-ray detector; scanning means (8, 11) for scanning the x-ray detector over an area, wherein: (a) the mounting and scanning means comprise additional means (31-35) for orienting the x-ray detector in at least one dimension towards the x-ray source during a scanning procedure; (b) wherein an orienting movement (31-35) and a scanning movement (8, 11) are independent degrees of freedom of the x-ray detector; and (c) the x-ray apparatus is configured for steering the orienting movement of the x-ray detector in coordination with the scanning movement of the x-ray detector (depending on the procedure).

However, Schwieker *et al.* failed to teach that the apparatus comprises means for digital data acquisition from the x-ray detector.

Kagaya disclosed a digital x-ray scanning apparatus that comprises means (7) for digital data acquisition from an x-ray detector (5). The digitized data are stored in a memory (8), and processed by an image-processing unit (13).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a digital data acquisition, since a person would be motivated to save the data on a computer readable medium for archival purpose and to perform image processing on a computer.

With regard to claim 2, Schwieker *et al.* in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein: (a) the mounting and scanning means comprise translational means (8, 11) for moving the x-ray detector along a straight line; or (b) the additional means comprise rotational means (31-35) for tilting the x-ray detector in order to maintain a constant aspect ratio of the x-ray detector as viewed from the x-ray source (column 3, lines 54-67; column 4, lines 1-5).

With regard to claim 10, Schwieker *et al.* in combination with Kagaya disclosed the x-ray apparatus according to claim 1. However, Schwieker *et al.* and Kagaya failed to teach that the x-ray detector is held in a position shifted toward an anode side of the x-ray source by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to shift the x-ray detector toward an anode side by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle, since a person skilled in the art would recognize the fact that the emission of x-rays is confined to an angle less than the anode angle.

With regard to claim 16, Schwieker *et al.* in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector has a digital signal processor (Kagaya, 13) and a digital memory (Kagaya, 8).

13. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwieker *et al.* (U. S. Patent No. 6,382,832 B1) and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Hoover *et al.* (U. S. Patent No. 3,869,615).

With regard to claim 12, Schwieker *et al.* in combination with Kagaya disclosed the x-ray apparatus according to claim 1. However, Schwieker *et al.* and Kagaya failed to teach that the x-ray collimator has an opening and comprises at least one movable shutter with a built-in collimator slit.

Hoover *et al.* disclosed an x-ray collimator has an opening (25), and comprises at least one movable (45) shutter (22-24) with a built-in collimator slit (26-28). Hoover *et al.* taught that this x-ray collimator could be used to optimize x-ray output (column 3, lines 55-61).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the x-ray collimator disclosed by Hoover *et al.*, since a person would be motivated to optimize the x-ray intensity in order to increase the signal-to-noise ratio.

With regard to claim 13, Schwieker *et al.* in combination with Kagaya and Hoover *et al.* disclosed the x-ray apparatus according to claim 12, wherein the x-ray collimator slit is positioned in a fixed distance from the x-ray source (inherent).

14. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwieker *et al.* (U. S. Patent No. 6,382,832 B1) and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Sashin *et al.* (U. S. Patent No. 4,179,100).

With regard to claim 14, Schwieker *et al.* in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector is connected to an A/D converter (Kagaya, 7) and to a computer (Kagaya, 13) for serial readout. However, Schwieker *et al.* and Kagaya failed to teach that the x-ray detector is a single-line x-ray detector with x-ray sensitive elements, wherein the x-ray sensitive elements comprise scintillator crystals and optical detectors.

Sashin *et al.* disclosed a single-line x-ray detector (Fig. 1c) comprising scintillators (40) and optical detectors (44).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the image intensifier with the single-line x-ray detector disclosed by Sashin *et al.*, since a person would be motivated to save cost associated with installing an image intensifier.



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15. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwieker *et al.* (U. S. Patent No. 6,382,832 B1), Kagaya (U. S. Patent No. 5,463,668), and Sashin *et al.* (U. S. Patent No. 4,179,100) as applied to claim 14 above, and further in view of Gard (U. S. Patent No. 5,220,589).

With regard to claim 15, Schwieker *et al.* in combination with Kagaya and Sashin *et al.* disclosed the x-ray apparatus according to claim 14. However, Schwieker *et al.*, Kagaya, and Sashin *et al.* failed to teach that the x-ray detector has means for gain and offset correction of analog signal from the x-ray detector.

Gard disclosed a means (60) for gain and offset correction of analog signal from an x-ray detector. Gard taught that a data acquisition system could introduce errors into a signal from an x-ray detector (column 1, lines 45-68; column 2, lines 1-6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a means for gain and offset correction of analog signal from the x-ray detector, since a person would be motivated to obtain an image that is free of error.

16. Claims 1, 2, 10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kresse (U. S. Patent No. 4,894,855) in view of Kagaya (U. S. Patent No. 5,463,668).

With regard to claim 1, Kresse disclosed a digital x-ray scanning apparatus comprising an x-ray source (1), an x-ray collimator (18), an x-ray detector (2), mounting means (6) for mounting the x-ray detector, scanning means (8, 12) for scanning the x-ray detector over an area, and a control unit (13) for steering the x-ray apparatus, wherein: (a) the mounting and scanning means comprise additional means (9, 10, 11) for orienting the x-ray detector in at least one dimension towards the x-ray source during a scanning procedure; (b) wherein an orienting

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movement (9, 10, 11) and a scanning movement (12) are independent degrees of freedom of the x-ray detector; and (c) the x-ray apparatus is configured for steering the orienting movement of the x-ray detector in coordination with the scanning movement of the x-ray detector (column 3, lines 15-21).

However, Kresse failed to teach that the apparatus comprises means for digital data acquisition from the x-ray detector.

Kagaya disclosed a digital x-ray scanning apparatus that comprises means (7) for digital data acquisition from an x-ray detector (5). The digitized data are stored in a memory (8), and processed by an image-processing unit (13).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a digital data acquisition, since a person would be motivated to save the data on a computer readable medium for archival purpose and to perform image processing on a computer.

With regard to claim 2, Kresse in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein: (a) the mounting and scanning means comprise translational means (8, 12) for moving the x-ray detector along a straight line segment; or (b) the additional means comprise rotational means (column 2, lines 64-68; column 3, lines 1-8) for tilting the x-ray detector in order to maintain a constant aspect ratio of the x-ray detector as viewed from the x-ray source.

With regard to claim 10, Kresse in combination with Kagaya disclosed the x-ray apparatus according to claim 1. However, Kresse and Kagaya failed to teach that the x-ray

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detector is held in a position shifted toward an anode side of the x-ray source by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to shift the x-ray detector toward an anode side by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle, since a person skilled in the art would recognize the fact that the emission of x-rays is confined to an angle less than the anode angle.

With regard to claim 16, Kresse in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector has a digital signal processor (Kagaya, 13) and a digital memory (Kagaya, 8).

17. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kresse (U. S. Patent No. 4,894,855) and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Hoover *et al.* (U. S. Patent No. 3,869,615).

With regard to claim 12, Kresse in combination with Kagaya disclosed the x-ray apparatus according to claim 1. However, Kresse and Kagaya failed to teach that the x-ray collimator has an opening and comprises at least one movable shutter with a built-in collimator slit.

Hoover *et al.* disclosed an x-ray collimator has an opening (25), and comprises at least one movable (45) shutter (22-24) with a built-in collimator slit (26-28). Hoover *et al.* taught that this x-ray collimator could be used to optimize x-ray output (column 3, lines 55-61).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the x-ray collimator disclosed by Hoover *et al.*, since a person would be motivated to optimize the x-ray intensity in order to increase the signal-to-noise ratio.

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With regard to claim 13, Kresse in combination with Kagaya and Hoover *et al.* disclosed the x-ray apparatus according to claim 12, wherein the x-ray collimator slit is positioned in a fixed distance from the x-ray source (inherent).

18. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kresse (U. S. Patent No. 4,894,855) and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Sashin *et al.* (U. S. Patent No. 4,179,100).

With regard to claim 14, Kresse in combination with Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector is connected to an A/D converter (Kagaya, 7) and to a computer (Kagaya, 13) for serial readout. However, Kresse and Kagaya failed to teach that the x-ray detector is a single-line x-ray detector with x-ray sensitive elements, wherein the x-ray sensitive elements comprise scintillator crystals and optical detectors.

Sashin *et al.* disclosed a single-line x-ray detector (Fig. 1c) comprising scintillators (40) and optical detectors (44).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the image intensifier with the single-line x-ray detector disclosed by Sashin *et al.*, since a person would be motivated to save cost associated with installing an image intensifier.

19. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kresse (U. S. Patent No. 4,894,855), Kagaya (U. S. Patent No. 5,463,668), and Sashin *et al.* as applied to claim 14 above, and further in view of Gard (U. S. Patent No. 5,220,589).

With regard to claim 15, Kresse in combination with Kagaya and Sashin *et al.* disclosed the x-ray apparatus according to claim 14. However, Kresse, Kagaya, and Sashin *et al.* failed to

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teach that the x-ray detector has means for gain and offset correction of analog signal from the x-ray detector.

Gard disclosed a means (60) for gain and offset correction of analog signal from an x-ray detector. Gard taught that a data acquisition system could introduce errors into a signal from an x-ray detector (column 1, lines 45-68; column 2, lines 1-6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a means for gain and offset correction of analog signal from the x-ray detector, since a person would be motivated to obtain an image that is free of error.

20. Claims 1, 2, 10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernstein *et al.* (U. S. Patent No. 4,024,403) in view of Stegehuis (U. S. Patent No. 5,287,396) and Kagaya (U. S. Patent No. 5,463,668).

With regard to claim 1, Bernstein *et al.* disclosed a digital x-ray scanning apparatus comprising an x-ray source (21), an x-ray detector (30), mounting means (35, 39) for mounting the x-ray detector, scanning means (40, 41, 42) for scanning the x-ray detector over an area, and a control unit (Fig. 3) for steering the x-ray apparatus, wherein: (a) the mounting and scanning means comprise additional means (65 MI) for orienting the x-ray detector in at least one dimension towards the x-ray source during a scanning procedure; (b) wherein an orienting movement (36) and a scanning movement (40, 41, 42) are independent degrees of freedom of the x-ray detector; and (c) the x-ray apparatus is configured for steering the orienting movement of the x-ray detector in coordination with the scanning movement of the x-ray detector (column 4, lines 39-46).

However, Bernstein *et al.* failed to teach that the apparatus comprises an x-ray collimator and means for digital data acquisition from the x-ray detector.

Stegehuis disclosed an x-ray collimator (11) that defines an irradiation field (Fig. 3).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an x-ray collimator, since a person would be motivated to image a region of interest by defining an irradiation field that encompasses that region of interest, and to block radiation exposure outside the region of interest.

Kagaya disclosed a digital x-ray scanning apparatus that comprises means (7) for digital data acquisition from an x-ray detector (5). The digitized data are stored in a memory (8), and processed by an image-processing unit (13).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a digital data acquisition, since a person would be motivated to save the data on a computer readable medium for archival purpose and to perform image processing on a computer.

With regard to claim 2, Bernstein *et al.* in combination with Stegehuis and Kagaya disclosed the x-ray apparatus according to claim 1, wherein: (a) the mounting and scanning means comprise translational means (40, 41, 42) for moving the x-ray detector along a straight line segment; or (b) the additional means comprise rotational means (36) for tilting the x-ray detector in order to maintain a constant aspect ratio of the x-ray detector as viewed from the x-ray source.

With regard to claim 10, Bernstein *et al.* in combination with Stegehuis and Kagaya disclosed the x-ray apparatus according to claim 1. However, Bernstein *et al.*, Stegehuis, and

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Kagaya failed to teach that the x-ray detector is held in a position shifted toward an anode side of the x-ray source by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to shift the x-ray detector toward an anode side by an angle  $\alpha$ , wherein  $0^\circ < \alpha < \beta$  with  $\beta$  = anode angle, since a person skilled in the art would recognize the fact that the emission of x-rays is confined to an angle less than the anode angle.

With regard to claim 16, Bernstein *et al.* in combination with Stegehuis and Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector has a digital signal processor (Kagaya, 13) and a digital memory (Kagaya, 8).

21. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernstein *et al.* (U. S. Patent No. 4,024,403), Stegehuis (U. S. Patent No. 5,287,396), and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Hoover *et al.* (U. S. Patent No. 3,869,615).

With regard to claim 12, Bernstein *et al.* in combination with Stegehuis and Kagaya disclosed the x-ray apparatus according to claim 1. However, Bernstein *et al.*, Stegehuis, and Kagaya failed to teach that the x-ray collimator has an opening and comprises at least one movable shutter with a built-in collimator slit.

Hoover *et al.* disclosed an x-ray collimator has an opening (25), and comprises at least one movable (45) shutter (22-24) with a built-in collimator slit (26-28). Hoover *et al.* taught that this x-ray collimator could be used to optimize x-ray output (column 3, lines 55-61).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the x-ray collimator disclosed by Hoover *et al.*, since a person would be motivated to optimize the x-ray intensity in order to increase the signal-to-noise ratio.

With regard to claim 13, Bernstein *et al.* in combination with Stegehuis, Kagaya, and Hoover *et al.* disclosed the x-ray apparatus according to claim 12, wherein the x-ray collimator slit is positioned in a fixed distance from the x-ray source (inherent).

22. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bernstein *et al.* (U. S. Patent No. 4,024,403), Stegehuis (U. S. Patent No. 5,287,396), and Kagaya (U. S. Patent No. 5,463,668) as applied to claim 1 above, and further in view of Sashin *et al.* (U. S. Patent No. 4,179,100).

With regard to claim 14, Bernstein *et al.* in combination with Stegehuis and Kagaya disclosed the x-ray apparatus according to claim 1, wherein the x-ray detector is connected to an A/D converter (Kagaya, 7) and to a computer (Kagaya, 13) for serial readout. However, Bernstein *et al.*, Stegehuis, and Kagaya failed to teach that the x-ray detector is a single-line x-ray detector with x-ray sensitive elements, wherein the x-ray sensitive elements comprise scintillator crystals and optical detectors.

Sashin *et al.* disclosed a single-line x-ray detector (Fig. 1c) comprising scintillators (40) and optical detectors (44).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to replace the image intensifier with the single-line x-ray detector disclosed by Sashin *et al.*, since a person would be motivated to save cost associated with installing an image intensifier.



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23. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bernstein *et al.* (U. S. Patent No. 4,024,403), Stegehuis (U. S. Patent No. 5,287,396), Kagaya (U. S. Patent No. 5,463,668), and Sashin *et al.* as applied to claim 14 above, and further in view of Gard (U. S. Patent No. 5,220,589).

With regard to claim 15, Bernstein *et al.* in combination with Stegehuis, Kagaya, and Sashin *et al.* disclosed the x-ray apparatus according to claim 14. However, Bernstein *et al.*, Stegehuis, Kagaya, and Sashin *et al.* failed to teach that the x-ray detector has means for gain and offset correction of analog signal from the x-ray detector.

Gard disclosed a means (60) for gain and offset correction of analog signal from an x-ray detector. Gard taught that a data acquisition system could introduce errors into a signal from an x-ray detector (column 1, lines 45-68; column 2, lines 1-6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a means for gain and offset correction of analog signal from the x-ray detector, since a person would be motivated to obtain an image that is free of error.

#### ***Allowable Subject Matter***

24. Claims 3-5, 7-9, and 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claim 3, the prior art discloses the x-ray apparatus according to claim 2, wherein the translational means is a carriage that is movable in a direction perpendicular to its

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lateral extension. However, it fails to teach or fairly suggest that the rotational means is a rotatable plate that is mounted on the carriage and is configured to receive an elongated single-line digital x-ray detector as claimed.

With regard to claim 4, the prior art discloses the x-ray apparatus according to claim 2. However, it fails to teach or fairly suggest that the x-ray apparatus further comprises a housing for receiving the translational and rotational means, and that the mounting and scanning means comprise means for repositioning the housing for different scanning procedures as claimed.

With regard to claim 5, the prior art discloses the x-ray apparatus according to claim 1, the x-ray apparatus further comprises means for swiveling the x-ray source and the collimator in coordination with the scanning movement and orienting movement of the x-ray detector. However, it fails to teach or fairly suggest that the x-ray apparatus further comprises a balanced suspension of the x-ray source and the collimator for a torque-free swiveling movement as claimed.

With regard to claim 7-9, the prior art discloses the x-ray apparatus according to claim 1, comprising a cassette holder for photographic film. However, it fails to teach or fairly suggest that the mounting means comprises a housing that receives the x-ray detector and the cassette holder in such a way that the x-ray detector and the photographic film are facing towards different side faces of the housing, and the mounting means performs a reorienting movement of the housing such that either the film cassette or the x-ray detector is positioned for x-ray imaging as claimed.

With regard to claim 17, the prior art discloses the x-ray apparatus according to claim 1. However, it fails to teach or fairly suggest the specific distances as claimed.

With regard to claims 18-20, the prior art discloses the x-ray apparatus according to claim 18. However, it fails to teach or fairly suggest that the x-ray apparatus further comprises a support arm for carrying the x-ray source, the x-ray collimator, and a housing for the x-ray detector, and the support arm is rotatable, and the x-ray source together with the x-ray collimator and the housing for the x-ray detector are tiltable with respect to the support arm as claimed.

### *Conclusion*

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Watanabe (U. S. Patent No. 6,325,537 B1) disclosed an x-ray diagnostic apparatus.
- (2) Negrelli (U. S. Patent No. 6,200,024 B1) disclosed a virtual C-arm robotic positioning system.
- (3) Tomisaki *et al.* (U. S. Patent No. 6,152,598) disclosed an R/F and chest radiography compatible x-ray imaging table.
- (4) Becker *et al.* (U. S. Patent No. 5,986,278) disclosed a multi-line x-ray detector.
- (5) Bucher (U. S. Patent No. 5,617,465) disclosed a scan-type x-ray imaging system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (703) 308-4858. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.



Allen C. Ho  
Patent Examiner  
Art Unit 2882

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